

# Operating Manual for Orbital and Linear Digital Shaker

*By: Burrell Scientific*

## OPERATIONS MANUAL

Linear Digital Shaker

Orbital Digital Shaker



### **Burrell Scientific, LLC**

300 Parkway View Drive

Pittsburgh, PA 15205

(412) 747-2111 • F: (412) 747-4927

email: [sales@burrellsci.com](mailto:sales@burrellsci.com)



*Please read the User Manual carefully before use, and follow all operating and safety instructions!*

## CONTENTS

1. Proper Use .....	1	7. Supported Load.....	8
2. Safe Operations .....	1	8. Faults.....	8
3. Unpacking .....	3	9. Interface.....	8
4. Trial Run .....	3	10. Maintenance and Cleaning.....	9
5. Control and Set .....	4	11. Associated Standards and Regulations .....	9
5.1 Control .....	4	12. Specifications .....	10
5.2 Set.....	5	13. Service .....	11
5.2.1 Set Time.....	5	12. Warranty.....	11
5.2.2 Setting Speed .....	5		
6. Operating Modes .....	6		
6.1 Mode A .....	6		
6.2 Mode B .....	7		
6.3 Switching the Mode.....	8		

## OPERATING INSTRUCTIONS

### WARNING:

**Do not attempt to assemble, connect to power source, or operate the Orbital and Linear Digital Shaker without first reading these instructions.**



**Also assure that each person that will operate this unit becomes familiar with these operating instructions.**

**Shakers are CE approved and comply with UL/CSA 61010-1 requirements, comply with EN 61010-1 safety requirements, and meet EN 61326-1: 2006 electrical equipment for measurement, control, and laboratory use EMC requirements.**

## 1. PROPER USE

The Orbital and Linear Digital Shaker is designed for mixing or shaking liquids in schools, laboratories or factories. The shaker is suitable for usage in various attachments for mixing liquids in bottles, flasks, test tubes for a maximum supported weight of 16.5 lbs.

## 2. SAFE OPERATIONS

	<b>Warning!</b> <ul style="list-style-type: none"><li>• Read the operating instructions completely before use and follow the safety instructions.</li><li>• Ensure that only trained staff work with the shaker.</li></ul>
	<b>Protective ground contact!</b> <ul style="list-style-type: none"><li>• Make sure the socket must be earthed (protective ground contact) before use.</li></ul>

1. When operating this unit always wear safety eye protection and suitable safety apparel for the material being shaken, taking into account the possibility of splashing liquids, vibration forces leading to a broken glass container, and the inhalation of the body, hair, clothes, and jewelry.
2. Do not operate this unit unattended.
3. Set up the shaker in a spacious area on a stable, clean, non-slip, dry and fireproof surface. Do not operate the shaker in explosive atmospheres with hazardous substances or underwater.
4. This shaker must be used with UL/CSA certified power supply cord set.

5. Ensure that the operating voltage required as stated on the shaker and voltage in the supply network match.
6. Do not modify this unit or attach any accessory that is not included with the Orbital and Linear Digital Shaker or is not an accessory manufactured by BURRELL SCIENTIFIC, LLC for this unit.
7. All BURRELL SCIENTIFIC, LLC accessories for the Orbital and Linear Digital Shaker must be securely attached to the shaker and vessels must be firmly placed on the shaking table prior to use. Inspect accessories for damage prior to use and always disconnect the power cord prior to attaching accessories.
8. Do not use the Orbital and Linear Digital Shaker if it or its accessories are damaged.
9. In all cases shake vessels with closures or rubber stoppers.
10. Caution should be taken when operating the shaker with heavy loads or at higher speeds where applicable.
11. Observe the vessel on the shaking table for liquid splashing out when setting the motor speed. Reduce motor speed if the shaker is not running smoothly.
12. If the procedure you are using involves gases or creates a hazardous environment – perform such testing in a properly ventilated fume hood. Keep in mind that working with combustible or flammable materials may result in additional hazards. Only process liquids that will not react dangerously to the extra energy produced through shaking.
13. If any spill occurs, assure all liquids have been cleaned up in a safe manner and the area of operation is completely dry to avoid an electrical hazard.
14. Do not touch any moving parts of the shaker.
15. Do not cover the shaker.
16. Protect the shaker and accessories from bumps and impacts.
17. Keep away from high magnetic field.
18. Always disconnect plug when the shaker is not in use.

**If you should encounter any problems with the installation or initial operations of this unit, please contact us at: 1-800-637-6074.**

### 3. UNPACKING YOUR SHAKER

#### Listing of Items

The packing includes the following items:

- The basic shaking unit
- Power cord (adapter with international orders only)
- Operation Manual
- Dish Tray
- Top Platform

Unpack the shaker carefully and check for any damages that may have occurred during shipment.

**Should any damage occur in shipment, do not operate and notify Burrell Scientific Customer Service department at 1-800-637-6074.**



**Note:** If there is any apparent damage to the system, please do not plug it into the power line.

#### 4. TRIAL RUN

Prior to operating the shaker with vessels and liquids, it is important to perform a trial run operation, to ensure the unit is working properly. Perform this as follows:

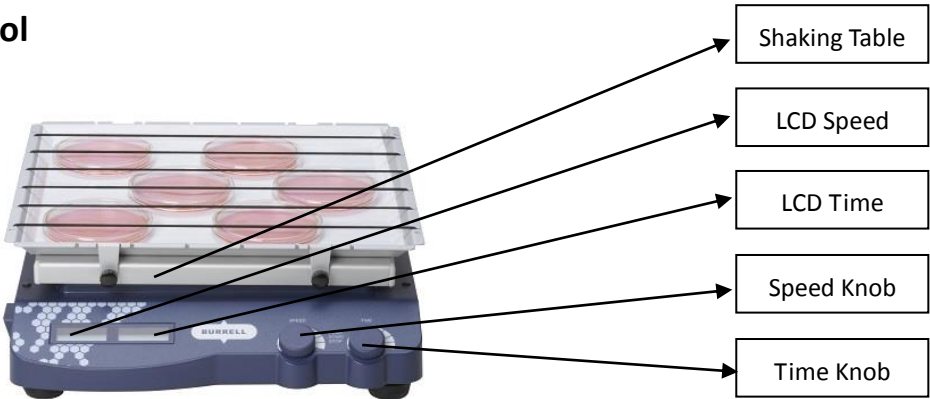
- Make sure the required operating voltage and power supply voltage match (100 – 240 V | 50 / 60 HZ).
- Ensure the socket is securely earthed.
- Plug in the power cable; then power ON the shaker.
- LCD displays the safe rotary speed limit.
- LCD displays operating mode.
- Turn the speed knob to set the rated rotary speed.
- Press the speed knob and turn the shaking function switch to ON.
- Press the speed knob again and turn the shaking function switch to OFF.

If the mounting surface is not even, you can improve the stability of the shaker with the adjustable feet. To do this, turn the appropriate foot downward with a wrench until the shaker is standing securely on the surface.



# 5. CONTROL AND SET

## 5.1 Control



Items	Description
Speed knob	Set rated rotary speed, “rotation” is switched ON or OFF via pressing the knob
Time knob	Set working time, “rotation” is switched ON or OFF via pressing the knob
LCD	Display the status of shaker and any set
Mains switch	Switch ON or OFF

## 5.2 Set

- Put the shaker on a stable and safe place. Plug in the mains power.
- Turn ON the mains switch on the left panel.
- The shaker starts self-test.
- The shaker shows desired speed and time after initialization.
- Turn the speed knob on to set the desired speed.
- Press the speed knob and characters on the left LCD stop flashing, shaking begins.
- Press the speed knob again and characters begin to flash, and the shaking function is switched OFF.
- Turn the time knob to set the desired time
- Press the time knob and characters on the LCD stop flashing, timing function begins.
- Press the time knob again and characters on the right LCD begin to flash, and the timing function is switched OFF.

### 5.2.1 Set Time

The desired shaking time can be set by turning the time knob. A distinction is made for the shaking time setting between Continuous Mode and Timed Mode. If Continuous Mode is selected by pushing the speed knob, the shaker can continue its shaking function for any

amount of time with the previously set speed. If Timed Mode is selected, by selecting time and pushing the time knob, the shaker can run in the set time. After the shaker is powered OFF and restarted, the set time is erased to zero and it switches into offline operating mode.

If a target time (max. 19h 59min) and speed are set, users can activate the shaker with pressing the time knob, time operations begin by:

- A. Pressing the time knob, the speed and time will stop. Pressing the time knob again restarts the shake function; the time will use the pre-set time.
- B. Pressing the speed knob, the speed and time will stop. Pressing the speed knob again, restarts the shake function (flashing occurs on the LCD). The time will use the pre-set time.



**Note:**

The current set time can be varied at any time.

### 5.2.2 Set Speed

The desired speed and upper speed limit can be set by turning the speed knob. The Continuous Mode can be switched ON with pressing the left knob without the time setting and switched OFF with pressing the knob again.

Adjust the motor speed knob slowly in order to keep the shaker running smoothly.



**Note:**

The current set speed can be varied at any time.

## 6. OPERATING MODES

### 6.1 Mode A

Operating Mode A is the default mode set at factory. After turning the shaker ON with the mains switch, the shaking and timing functions are turned OFF. The LCD displays the set time and speed values. They are adopted or varied when the corresponding functions are turned ON. After turning the shaker ON, the following process will be shown on the display:

- The left LCD displays “SAFE” and the right displays the upper speed limit (rpm) which can be set by pressing the speed knob and turning at the same time.

SAFE 550

- The LCD displays run modes “StA”, “A”, or “B” for about 2 seconds.

STA b

- The set or stored speed value is shown in the left display, and the set or stored time value is shown in the right display. Turn the speed knob and time knob can set the speed and time.

160 2:35

- After pressing the speed knob or time knob, the shaker begins to run at the set speed. The actual speed and time remaining are shown in the LCD. If the remaining has reached zero, the shaker stops its motion. Pressing the speed knob alone, the shaker will work at Continuous Mode (The time function is OFF).



**Note:** The set values can be varied during shaking. Shaking can be stopped by pressing the left or right knob.



## 6.2 Mode B

When the shaker is turned ON and values for speed and time are erased to zero, users can set the upper speed limit from Operating Mode A. After the power has been turned OFF, the shaker will no longer automatically start up in operating Mode B by itself.

After turning ON the shaker and selected run mode, the following process will be shown on the display:

- The left LCD displays “SAFE” and the right displays the upper speed limit (rpm) which can only be changed during start up.

SAFE 550

- The LCD displays run modes “StA” for 2 seconds.

stA b

- The set speed value is shown in the left display, and the set time value is shown in the right display. Then set the motor rotary speed and time.

000 0:00

160 2:35

- After pressing the speed knob or time knob, the shaker begins to run at the set speed. The actual speed and time remaining are shown in the LCD. If the remaining has reached zero, the shaker stops its motion.

160 2:30



**Note:** The set values can be varied during shaking. Shaking can be stopped by pressing the left or right knob.

## 6.3 Switching the Mode

Switch the operating mode as follows:

- Turn OFF the shaker with the mains switch.
- Hold down both knobs and turn ON the shaker with the mains switch. After 5 seconds, let go of knobs.
- Switch between operating Modes A and B in order.

## 7. SUPPORTED OPERATION

- In order to ensure safe operations, the shaker must only be operated within the supported weight limit.
- Make sure the holding surface of the shaker is always clean and level.
- Ensure the individual shaking vessels are placed evenly and fastened securely in the middle of the shaking table, regardless of number of vessels being shaken (one to multiple).

## 8. FAULTS

- When switched ON, and the shaker doesn't work:
  - Check whether the power cable is fully inserted
  - Check whether the fuse is broken

- The speed cannot reach set value:
  - Check whether it is overloaded
- The motor does not start via pressing the speed knob and time knob:
  - Check whether the time is set to zero

## 9. INTERFACE

The Orbital and Linear Digital Shaker, special adapter, and cable are used to link to external device and the standard 9-pin interface to connect with a PC.

- The cable between the shaker and a computer use an EIA Standard RS232C communication line, corresponding to the DIN 66020 interface.
- Transmission method: Asynchronous signal transmission.
- Mode of transmission: Fully Duplex.
- 1 start bit; 8 character bits; 1 stop bit.
- Transmission speed: 9600 bit/s

## 10. MAINTENANCE AND CLEANING

Only use these cleaning agents which have been approved by the manufacturer to clean the shaker:

Dyes	Isopropyl alcohol
Construction materials	Water containing mild detergent / isopropyl alcohol
Cosmetics	Water containing mild detergent / isopropyl alcohol
Foodstuffs	Water containing mild detergent
Fuels	Water containing mild detergent

Please contact Burrell Scientific, LLC prior to using any other cleaning or decontamination method to ascertain that this method will not destroy the shaker. Wear the proper protective gloves during cleaning of the shaker.

Please Note:

- The shaker must not be placed in the cleaning agent for the purpose of cleaning. Spot clean only.
- The shaker must be cleaned and put into the original packaging carton before sending out for service or repair.

- Switch the shaker to the OFF position and store in a dry, clean, and stable place at room temperature when not in use.

## 11. ASSOCIATED STANDARDS AND REGULATIONS

### Construction in accordance with the following safety standards

EN 61010-1  
UL 3101-1  
CAN/CSA C22.2(1010-1)  
EN 61010-2-10

### Construction in accordance with the following EMC standards

EN 61326-1

## 12. SPECIFICATIONS

Items	Specifications
Voltage (VAC)	100 ~ 240
Frequency (Hz)	50 / 60
Power (W)	30
Shaking Movement	Orbital / Linear
Orbital Diameter (mm)	10 (7.5 kg)
Max. Shaking Weight (with attachment)	16.5 lbs. (7.5 kg)
Motor Type	External rotor brushless motor
Motor Rating Input (W)	28
Motor Rating Output (W)	15
Permissible ON Time (%)	100
Speed Range (rpm)	100 – 350 (Linear) 100 – 500 (Orbital)

Items	Specifications
Speed Display	LCD
Timer	Yes
Timer Display	LCD
Time Setting Range (min)	1 – 1199
Run Type	Time / Continuous Operation
Dimensions (D×W×H mm)	420 × 370 × 100
Shipping Weight	32 lbs
Permissible Ambient Temperature (°C)	5 – 40
Permissible Relative Humidity	80%
Protection Class Acc. To DIN EN60529	IP21
RS232 interface	Yes

## **SERVICE**

If assistance is needed, please contact Burrell Scientific, LLC for technical support. Please provide the Customer Care Representative with the following information:

- Serial Number (located on the rear panel)
- Certification
- Description of problem (i.e., hardware or software)
- Methods and procedures used to resolve the issue
- Your contact information

## **WARRANTY**

This shaker is warranted to be free from defects in materials and workmanship under normal use and service, for a period of 12 months from the date of invoice. The warranty is extended only to the original purchaser. Warranty will not apply to any product or parts which have been damaged on account of improper installation, improper connections, misuse, accident or abnormal conditions of operations. Shakers can only be returned after receiving a return authorization # from Burrell Scientific, LLC.

**NOTES**

---

---

---

---

---

---

---

---

---

---